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### Earth Science background information for the Mosedale/ Mungrisdale area.

The story of Mosedale is told by its rocks. The evidence to explain the sequence of events that took place over millions of years is in the rocks. It is a complex area and for KS2 we concentrate on the use of the local rocks and aspects of recent weathering, erosion, transport and deposition. The Teaching Trail Notes list the Key points to investigate:

We are looking at four aspects of these exposures of rock:

- 1 – to find out how the rocks were formed.
- 2 – to find out what happened to the rocks after they were formed.
- 3 – to find out what is happening to them today or in the recent past.
- 4 – to find out what they have been used for by Man.

### Summary of the Geological History

The rocks of Mosedale consist mainly of Ordovician sediments, folded and metamorphosed into slate, with a range of igneous rocks intruded about 400 million years ago. After millions of years of erosion and changes of sea level, limestones were deposited and later uplifted, with further erosion and deposition in a desert environment. The present landscape owes much to the more recent erosive power of rivers and glaciers. The main features of the geological history of the area are:

- 500 - 435 million years ago, during the Ordovician Period, much of Britain was under the sea, south of the equator. Muddy and sandy sediments were washed in and settled down as layers in the deep water. Fossils of sea creatures are sometimes found. Layers built up over millions of years and the sediments hardened into rock. As the ocean closed by the action of plate tectonics there was volcanic activity.
- 440 - 375 million years ago the ocean finally closed in a collision between two of the Earth's plates. There were severe earth movements which folded, faulted and uplifted much of Britain. The intense pressure not only folded the rocks but metamorphosed mudstones into slate. Heat deep in and under the crust caused rocks to melt and produce magma. This forced its way through cracks in the crust to form dykes, reaching the surface to produce volcanoes, often on the seafloor. At least three types of igneous rocks will be seen on the Trail. In School House Quarry dolerite dykes are exposed. Carrock Fell is made of two very different igneous rocks of differing ages. The dark rock is gabbro and the pinky coloured one is microgranite (sometimes called granophyre).
- From 375 million years ago the great continental chain of NE–SW mountains were subjected to repeated weathering, erosion and earth movements.
- About 340 million years ago in the Carboniferous Period, sea level rose and limestone was deposited in warm tropical seas to the north and east. This rock and its fossils can be seen in Howk Gorge, west of Caldbeck. (For details see the KS3 ESO-S materials for Mosedale.)
- 290 - 280 million years ago a further collision took place. Uplift and further erosion of the area took place and sediments were deposited in a desert environment during the Permian and Triassic Periods, as Britain lay near the Tropic of Cancer. These red rocks owe their colour mainly to the mineral, haematite, an iron oxide. They range from conglomerates to fine sands and mudstones, deposited as sand dunes or in flash river floods. An example is Penrith Sandstone, seen in local buildings.
- Over the last several million years the landscape has been weathered and eroded by water and, during the last two million years, by ice sheets almost to the landscape we have today. The scree on the sides of mountains and the remains of gravel left by meltwater are examined on the Trail. The arrival of Man brought agriculture and quarrying.
- Even though quarrying has ceased, the processes of weathering and erosion are still operating today on rocks in walls, buildings and quarries. The rocks are weathered by chemical and physical processes, helping to break down the rocks to form soil, which plants quickly colonise. Rabbits, moles, minibeasts and plant roots further help to break up rock material and gravity carries it downhill to form new scree slopes at the base of many quarry faces.
- The wildlife and geological features of large areas of Cumbria are conserved for the benefit of everyone. We hope that you and your children will enjoy the visit. More detailed information on the geological history can be found in the teacher notes for KS3 and KS4.